

EXHIBIT 49



**Lockwood, Andrews
& Newnam, Inc.**
A DAVIS COMPANY

SUBJECT:

DESIGN NOTES AND COMPUTATIONS

SPREAD SHEET NO. OF

8/11/13 Flows into MTS.

- D.S. can we get by item 1 w/ 30 days storage vs. 30
- P.C. - 20/30 days. They don't care, more concerned about delivery, ozone effectiveness of CT

~~✓~~ J.W. has done report/pilot study -
no CT credit

Reduces H_2O_2 demand, reduce generation of THMs .

- Thought up lake water, we could get CT credit, but no perm. Study done because lake water was not available.

- Proposing to use mid-pot ozone chlorination for CT

P.C. thinks MDQ would approve CT credit for Great Lakes H₂O.
Basis of logic: for ozone.

They have mid-pot & end-pot sampling points, but no monitors. Piping is free to add.

S.B. wondering if ozone credit better option than transfer p.s.?

M.P. can ozone CT H₂S @ 12 mgD & 18 mgD

buffering factor = 0.28

Thought there was enough CT credit through 3 mgD storage -
2 high pH & low water temp.

- O₃ & N₂ storage. DEP would still want redundancy.
currently have 18-19 days. Have to look @ delivery times.

MDQ confirms we don't need Duct to get CT credit.

P.C. recommends calcinc CT H₂S & giving range of operation &
giving that info to City WTP Staff.

M.P. wants monitoring pit after ~~filter~~ 1 in ozone for more CT credit

P.C. - get more credit for lower current flow vs. current flow.

EXHIBIT

GREEN - 36

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CONTAINS CONFIDENTIAL INFORMATION
NOT TO BE DISCLOSED UNDER FOIA.
RESPONSE TO GCPO SUBPOENA.

DATE

CHECKED BY

DATE

PROJECT NUMBER

D-004

EXHIBIT

Hansen 8

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PENGAD 800-631-6989	DEPOSITION EXHIBIT 50
12/31/14	

LAN_GCPO_00036324

Conc. feed - place bider in case we need different conc for lake. Also
G.C. doing some investigation there

~~#3~~
Concept: 3 supplies, no back-up generator.

P.C. thought "recent area wide black-out. Wanted about generator."

W.L. - full DWP load - 3.4 MVA. Can look at 1 gen or 2 gen.
W.L.

v.s. full rebuild of substation.

S.B. - could use generator to offset peak charges from C.R.

~~#3~~ out - we already covered up Dart under this

~~#4~~
to comment

~~#4~~ H.S. pumps oversized. VFD's & ventilation.

~~#4~~ out.

~~#5~~ includes expansion to monitor plus replacement of outdated PLC's.

~~#6~~ New connection to feed RWT 44.0

M.P. just wanted to confirm cut/cap of downstream, unused 72".
or removed spool piece. A physical break.

- w/out filter transfer etc. - how to transition from Flint River to RWT supply?

~~#7~~ 3 a). Brey Rd. option for short term. DEQ said no. until Flint addresses
corrective action that has been defined by DEQ. Solid waste.

Brent says flat ✓

- possible use old settling basins @ plant 1 - dewater, & leave in basins

- temp plate presses. Co. in Pennsylvania

- S.B. / P.C. - said can't just leave sludge there. Need to dispose somehow.

- condition unknown. S.B. may think we need off to Brey Rd.

Proposed Scope of Upgrades to Flint WTP

1. Introduction

The City of Flint plans to utilize their existing WTP to provide water on a continuous basis. The city plans to treat water from the Flint River until construction of the proposed KWA supply is complete and the WTP can then be used to treat water from Lake Huron. An evaluation of the WTP to provide treatment of water from both sources is in process to define the scope of upgrades needed to provide reliable service. In addition to the different treatment requirements of each source, the WTP has not been operated on a continuous basis for 40+ years so facilities are also being evaluated to identify equipment which should be replaced because of its age, condition, or obsolescence.

2. Preliminary Scope of Work

Based on the WTP evaluation, the following scope of proposed upgrades has been developed. This summary is preliminary, provided for review and comment by interested parties. Comments received will be used to finalize the scope of work to be implemented at the Flint WTP.

The proposed upgrades have been categorized into two phases. Phase 1 is work that will be completed as soon as practical so that the WTP can be utilized to treat water from the river in 2014. Phase 2 work is needed to provide long-term service with the proposed KWA Lake Huron water source. Phase 2 work will be completed in 2015 to 2016.

Work is proposed to be contracted except where noted "by city" the work is planned to be completed by City staff.

Item 1 -- Chemical Systems / Ozone

Additional storage of nitrogen and oxygen will be provided for redundancy and 30 day capacity.

Existing ozone units will be serviced to prepare for continuous operation.

New alternative coagulant chemical feed system will be added for treatment of raw water from Lake Huron.

Phase 1	Phase 2
Oxygen and nitrogen storage	New coagulant feed system
Service existing ozone system (by city)	

Item 2 – Electrical

The WTP presently uses 2400V as primary power. Power feeders and switchgear are rated at 5kV. Upgrading the primary power to 4160V will enable existing power feeders to provide twice the power and eliminate the need to install new feeder circuits throughout the WTP.

The current substation has two 2.5 MVA transformers running in parallel for a total capacity of 5 MVA. The transformers are obsolete. It is planned that the transformers and conductors to the WTP will be replaced to provide two independent power sources for redundancy. The existing on-site backup power generators are obsolete and inoperable. Since two independent power sources will be provided to the WTP, replacement of the generators is not proposed.

Electrical switch gear and equipment at Pump Station 4 will be replaced.

If filter presses (or other equipment) are utilized for dewatering of softening sludge, a new power feed will be required to the equipment.

Electrical switch gear and equipment at Plant 2 will be replaced.

Phase 1	Phase 2
Upgrade existing substation and power supply	Upgrade power system at Plant 2
Upgrade facilities at Pump Station 4	
<i>Power to filter presses? TBD</i>	

Item 3 – Mid-Point Chlorination

Mid-point chlorination facilities are proposed, including the following principal components:

- Feeders, scales, monitors
- Piping, valves, and controls
- Scrubber
- Ton Containers
-

Phase 1	Phase 2
Mid-point chlorination	

Item 4 – Security Measures

Add three additional security cameras to monitor the following areas:

- Chlorine storage area
- Oxygen and Nitrogen storage area
- East side of WTP property

Phase 1	Phase 2
Additional security cameras (by City)	

Item 5 – Low and High Service Pump Station No. 4

As a result of decreased demands, pumps at Pump Station No. 4 are “over-sized” and do not efficiently operate. Some of the pumps experience vibrations in the shafts and steady bearings. The existing pump station will be rehabilitated to replace “over-sized” pumps and obsolete equipment and provide needed maintenance. Proposed work includes:

- 25 mgd Low Service Pump No. 4 – upgrade motor to Inverter duty, rehabilitate pump and piping, install new valve, and install new VFD
- 15 mgd Low Service Pump No. 6 – rehabilitate pump shaft and bearings
- Install two new High Service Pumps (15 mgd @190 feet TH, vertically mounted pumps with 800 HP 2400/4160 V inverter duty motors, with 20 feet of shaft and steady bearings)
- Replacement of existing piping, valves, supports, and bearings
- New intermediate platforms, ladders, & stairs
- New ventilation (for exhausting heat from VFD's)
- Install two medium voltage VFD units
- Demolition of existing equipment to accommodate new equipment

Rehabilitation of Pump Station No. 4 is planned to be completed in two phases. A new high service pump and a new low lift pump will be installed initially to provide efficient service during the period when water from the Flint River is treated. Additional high service and low lift pumps will be installed later to provide long-term reliable, efficient service.

Phase 1	Phase 2
Rehabilitate Pump 6 shaft and bearings (by City)	Rehabilitate 25 mgd Low Service Pump No. 4, new motor, new valve, new VFD
New High Service Pump No. 1	New High Service Pump No. 2
Install VFD for Pump No. 1	Install VFD for Pump No. 2
Provide ventilation for Pump No. 1	Provide ventilation for Pump No. 2
Demolition of existing equipment	Demolition of existing equipment

Item 6 – Filter Transfer Station

Recent changes in regulations, enhanced CT is required. Additional CT can be provided by including the volume of the Dort Reservoir in the process train. However, because of its elevation with respect to other treatment processes, pumping will be required to utilize the reservoir. The proposed pumping facility will provide for the following:

- Three 12 mgd @ 40 ft TH vertical turbine pumps with 150 HP, 480 V inverter duty motors are planned.
- Valves and Controls
- Ventilation and boiler system
- Three low voltage VFD's
- Power feeders
- MEP
- Piping connections
- 200 feet of 30" water main
- 600 feet of 36" water main
- Site work, paving, & utilities

Phase 1	Phase 2
Filter Transfer Pump Station	

Item 7 – SCADA

As new pumps, chemical systems, and controls are installed; instrumentation and monitoring should be provided. It is proposed that the SCADA network is upgraded to current technology and software and training provided in the initial phase.

Phase 1	Phase 2
SCADA Network Upgrade	SCADA Hardware (Phase 2)
Software and Training	
SCADA Hardware (Phase 1)	

Item 8 ~ Raw Water Piping Connection

The proposed KWA raw water pipeline will connect to the existing 72" PCCP finished water supply line near Center and Pierson Roads. (East of this connection, the 72" PCCP will be utilized by GCDC-WWS for distribution of finished water in the GCDC-WWS service area.) Raw water from Lake Huron will be conveyed to the WTP site via the 72" PCCP pipeline. On the WTP site, the 72" pipeline will be tapped for a 42" pipe and for a 36" pipe to convey raw water for treatment. The following work is proposed:

- Piping connections – *make some cuts in ph 1 instead of 2*
to avoid having to tap in service lines
- 900 feet of 42" water main
- 100 feet of 36" water main
- Roadway and site restoration
- Storm sewer relocation
- Control valve rehabilitation and replacement

Phase 1	Phase 2
	Raw water piping connections

3. Other Items to Address to Finalize Scope of Work

In addition to the upgrades proposed above, the following issues/questions need to be addressed before finalizing the scope of proposed upgrades to the WTP:

- a) Options for handling / disposal of lime sludge from softening operations (during period Flint River is water source)
- b) Requirements for CT and enhanced treatment
- c) Impacts of using river as continuous supply (quantity, quality monitoring & control, reservoir operating levels)
- d) Chemical storage options

Other PWP thoughts

- S. 3. Considering about transition of ~~other~~ supplies.
DWSD to Flint or KWA, would have some blending
- Future U.V.? Should include in transfer to DWSD fees.
- ~~By 2025~~ long term plan is to make provisions to add, if needed
in the future
- DWP req's can be in parallel, in series not necessary
to get crypto credit - has to be DWP approved - extra steps
- S.P. still subject to E.M./State buy off.

Recap

Ph. 1.

- Dart out, spill used chemicals
- look at generators
- mid pt Cl₂ out
- Pump impo in/good
- Security in
- file out
- #7 stays same
- #8

M.P. to send CT #'s / calcs to DWG, cc: Brent.

~ we will develop plan for short term lime sludge.

~ mid pt. Cl₂ before filters, even w/out Dart.
Brent wants something after softening.

~ Possible convert Dart to raw storage then.

~ Better option seems to be still have transfer sta. & use as
finish storage, but not until ph. 2.

- ~ Work with Corning 4/10/21. ~ 8 AM. { SWBS
{ suggests
- ~ flat morning after ph. 15 PM.
Take the walls before for training.